Family of Interoperable Operational Pictures (FIOP)

Ms. Robin Quinlan
Deputy Director, Systems Interoperability

Office of the Secretary of Defense

3070 Defense, Pentagon Rm 3C261

Washington, DC 20301-3070

quinlarl@acq.osd.mil   (703) 697-8048

Office of Secretary of Defense

Secretary of Defense

Deputy Secretary of Defense

**Under Secretary of Defense
(Acquisition, Technology & Logistics)
Dr. Jacques S. Gansler**

**Principal Deputy
David R. Oliver, Jr**

**Director, Interoperability
Dr. V Garber**

Director, Interoperability

Mission

USD(AT&L) focal point for advancing joint and coalition interoperability by building system-of-systems capabilities in support of future operations.

> *-- Interoperability --*
> *Achieving 100% of Operational Capability*

> **Cooperation with allies and coalition partners from the beginning.**

What is Interoperability?

"**Ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.**"

(JCS Pub 1)

- **Interoperability today is a <u>critical problem in joint force & combined operations</u> -- CINC's top issue**

- **<u>Getting worse, not better</u>, as new coalition partners develop, complex systems are acquired, and "fixes" to past problems are applied in stove-piped fashion**

- **Joint Vision 2020 calls for <u>increasingly network centric warfare</u>, dependent upon fully interoperable systems**

Interoperability - The Way Ahead
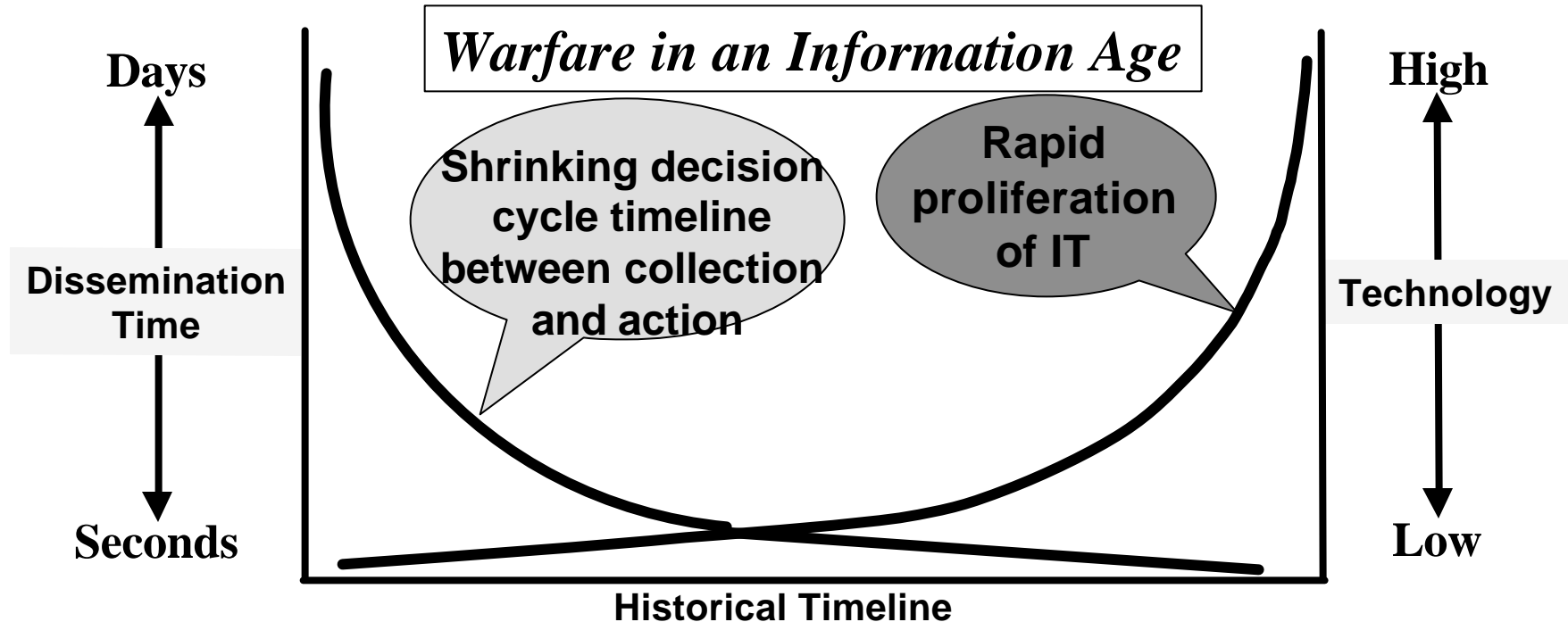
Today's Systems:

- <u>Tactics/Techniques/Procedures</u> to best use today's systems

- <u>Technology/SW</u> fixes to make today's systems more interoperable

Future Systems:

- <u>Acquisition processes</u> for new systems and upgrades focused on interoperability (requirements, standards, development, testing) - systems must be "born joint"

Evolving Today's Systems - An Example
-- Family of Interoperable Operational Pictures --

Warfare in an Information Age

Days

Dissemination Time

Shrinking decision cycle timeline between collection and action

Rapid proliferation of IT

High

Technology

Seconds

Low

Historical Timeline

Network Centric Warfare, *Joint Battlespace Infosphere*, and the *Digitized Battlefield* require a coherent, consistent, and unambiguous view of the battlespace --- containing actionable, decision quality information, and with the goal of achieving decision superiority during combat operations.

Need to get from "knowing to doing" inside any enemy's decision cycle …an ISR, C2 and battlespace management problem

A Key Interoperability Challenge
...in getting from "knowing to doing"

- No coherent view of the battlespace from CINC to Soldier/Sailor/Airman/Marine....
  – Hinders the ability to prosecute a fully coordinated strategy
  – Unable to achieve full system effectiveness
- What do we do about it?
  – FIOP....

  Family of Interoperable Operational Pictures

Today's Problem

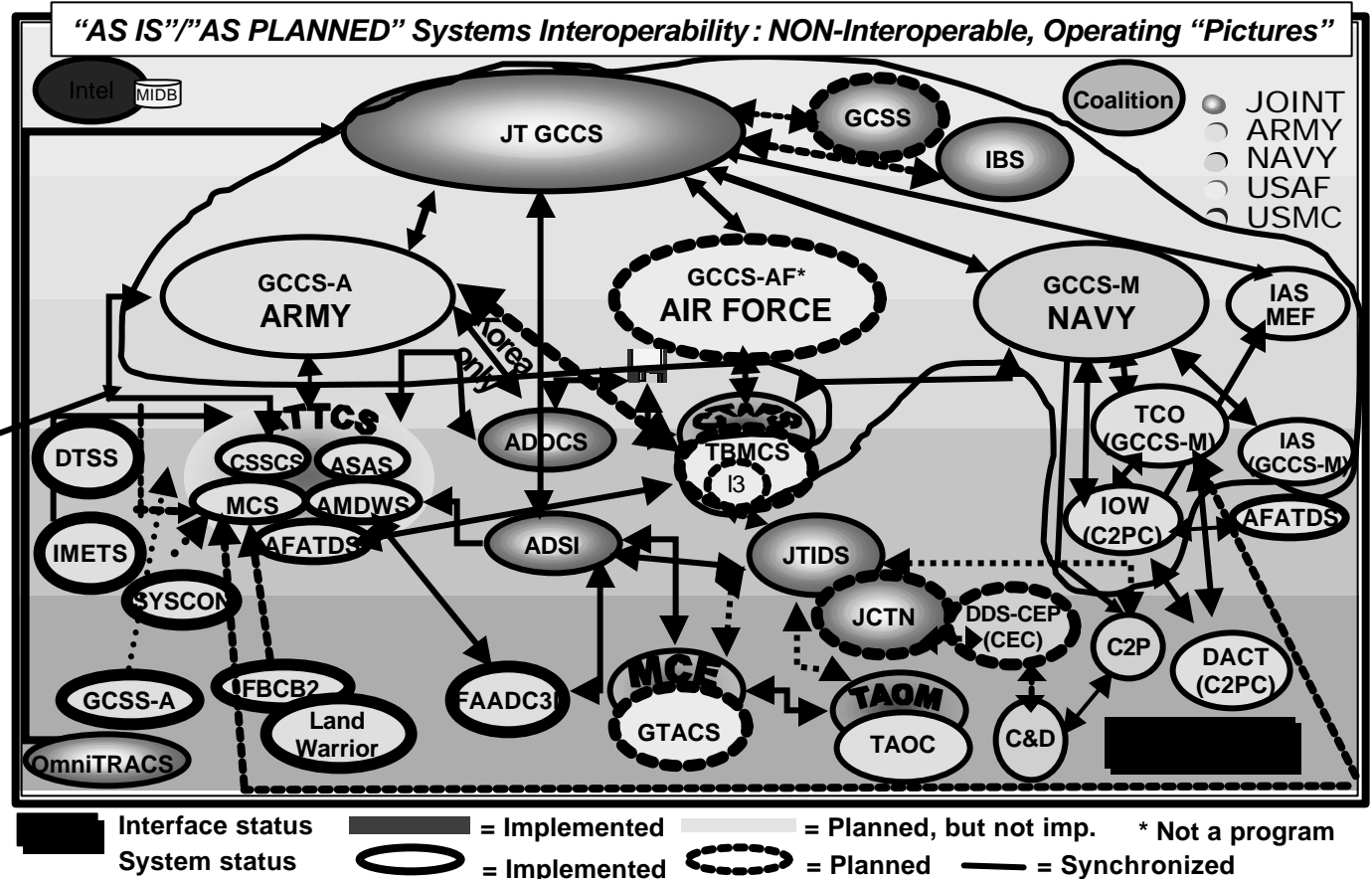**Inadequate interoperability = fratricide, leakers, lack of effectiveness**

USER	CONCEPT	CORRESPONDING SYSTEMS: "As-Is / As Planned"

CINC — Operational-level "pictures"

JTF — Tactical-level "pictures"

Capability to synch these systems IF identical COE level & SW version w/ COP Synch Tools

Firing Unit — Aerospace, Ground, Maritime "pictures"

"AS IS"/"AS PLANNED" Systems Interoperability : NON-Interoperable, Operating "Pictures"

Intel — MIDB — JT GCCS — GCSS — IBS — Coalition — JOINT, ARMY, NAVY, USAF, USMC — GCCS-A ARMY — GCCS-AF* AIR FORCE — GCCS-M NAVY — IAS MEF — Korea only — TTCs — DTSS — CSSCS — ASAS — MCS — AMDWS — AFATDS — IMETS — SYSCON — ADOCS — TBMCS I3 — ADSI — JTIDS — TCO (GCCS-M) — IAS (GCCS-M) — IOW (C2PC) — AFATDS — GCSS-A — FBCB2 — Land Warrior — FAADC3 — MCE — GTACS — JCTN — DDS-CEP (CEC) — C2P — DACT (C2PC) — TAOM — TAOC — C&D — OmniTRACS

Interface status ▬ = Implemented ▬ = Planned, but not imp. * Not a program
System status ◯ = Implemented ⬭(dashed) = Planned ── = Synchronized

- *The cause*: multiple systems, conceived and developed individually
- Compounding the problem: systems, TTP, missions changing continuously, new coalition partners, stovepiped intelligence dissemination
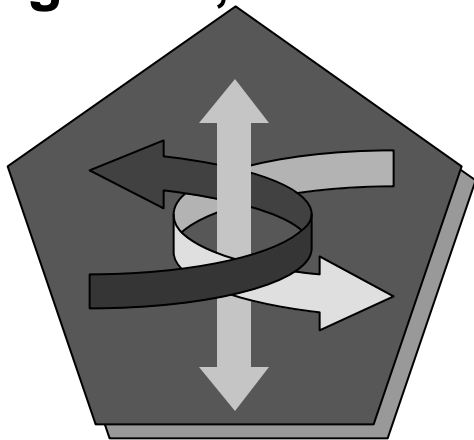
Notes:
• Some Svc systems deployed on other Svc platforms
• As is depicts presence in at least one CINC theater

FIOP - Federating the Battlespace Pictures

- **A coherent view of the battlespace from the CINC to the soldier/sailor/airman/marine, beyond situational awareness to include battlespace management, fire support, intelligence, logistics, etc.**


- **Drawn from federated and/or interoperable databases**
- **Configured according to user needs**
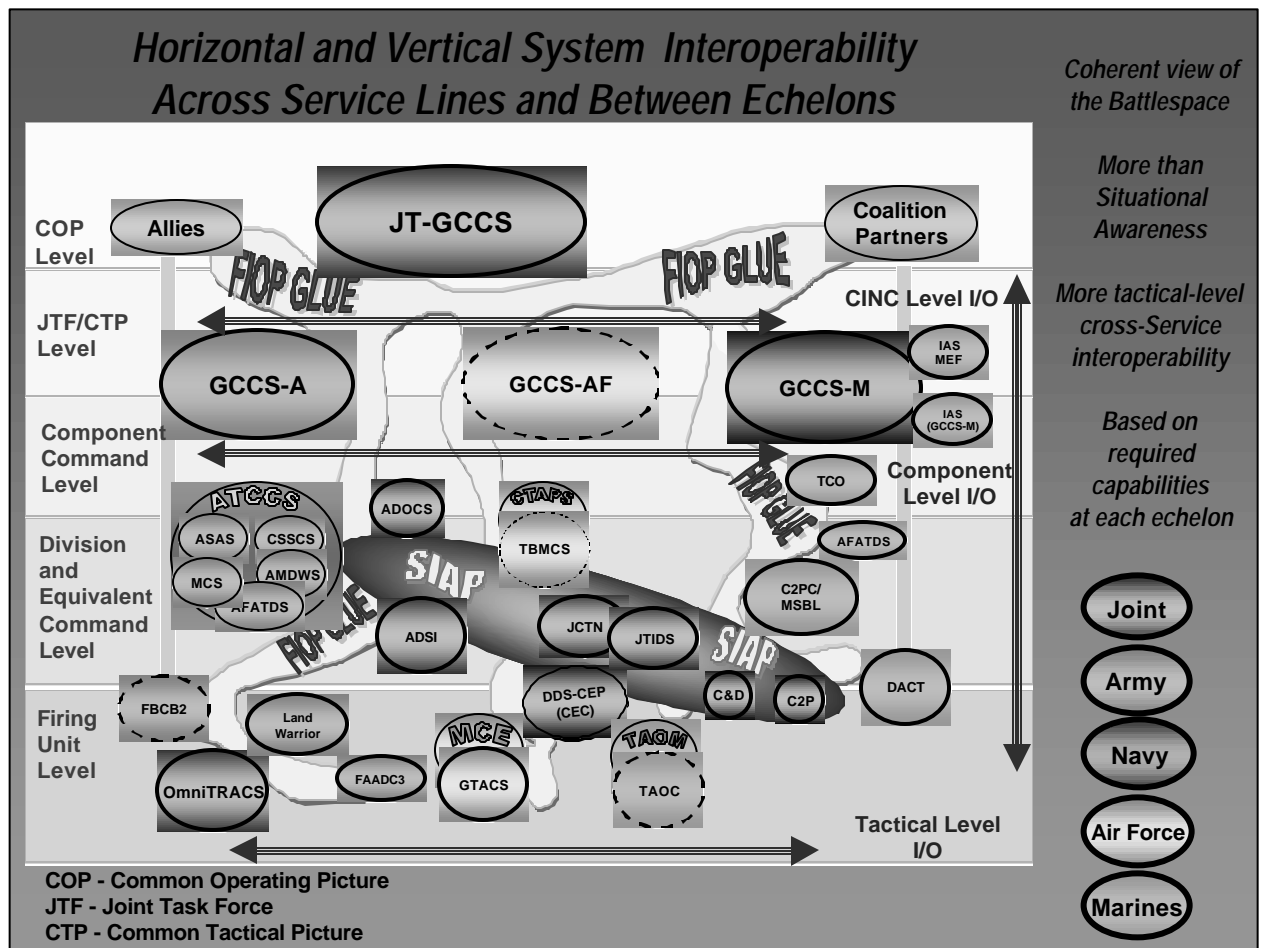
How to Implement the FIOP Concept

FIOP Systems Architecture: Needed interoperability of Service systems

• What are the "communities of shared interest" that <u>need</u> to be interoperable?

• Assess whether there are any interoperability changes that can immediately fill a gap in required capabilities
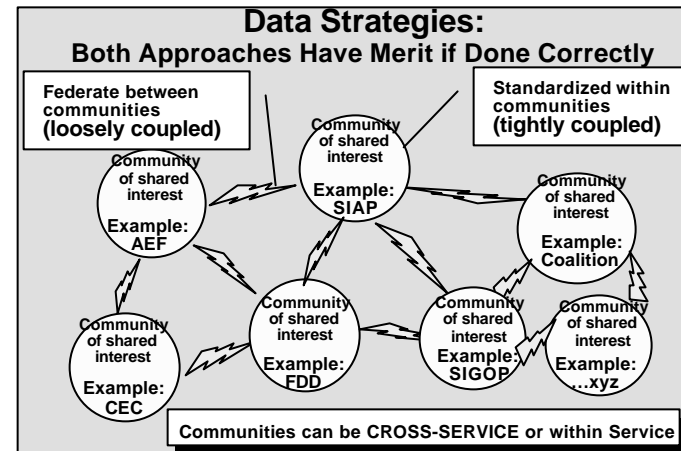
 - - e.g., USA/USMC tactical system I/O

Systems Engineering

AS IS" Systems Connectivity: NON-Interoperable, Operating Pictures
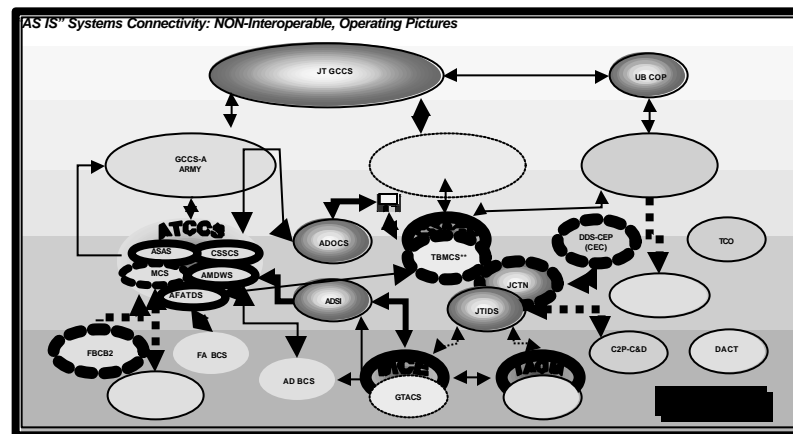
The "Glue": How to Implement the FIOP Concept

Specific Technical Tasks:

1. Federating Data Strategy →

- Federating heterogeneous data bases (e.g., one size does <u>NOT</u> fit all)

Data Strategies: Both Approaches Have Merit if Done Correctly

Federate between communities (loosely coupled)

Standardized within communities (tightly coupled)

Community of shared interest — Example: SIAP

Community of shared interest — Example: AEF

Community of shared interest — Example: Coalition

Community of shared interest — Example: CEC

Community of shared interest — Example: FDD

Community of shared interest — Example: SIGOP

Community of shared interest — Example: ...xyz

Communities can be CROSS-SERVICE or within Service

2. Information Security →

- Adopting commercial
- Allied/coalition friendly

MULTIPLE LEVELS of Security "TO BE"

COALITION

US

Collateral

LONG TERM: DISSEMINATION/GUARD TECHNOLOGIES

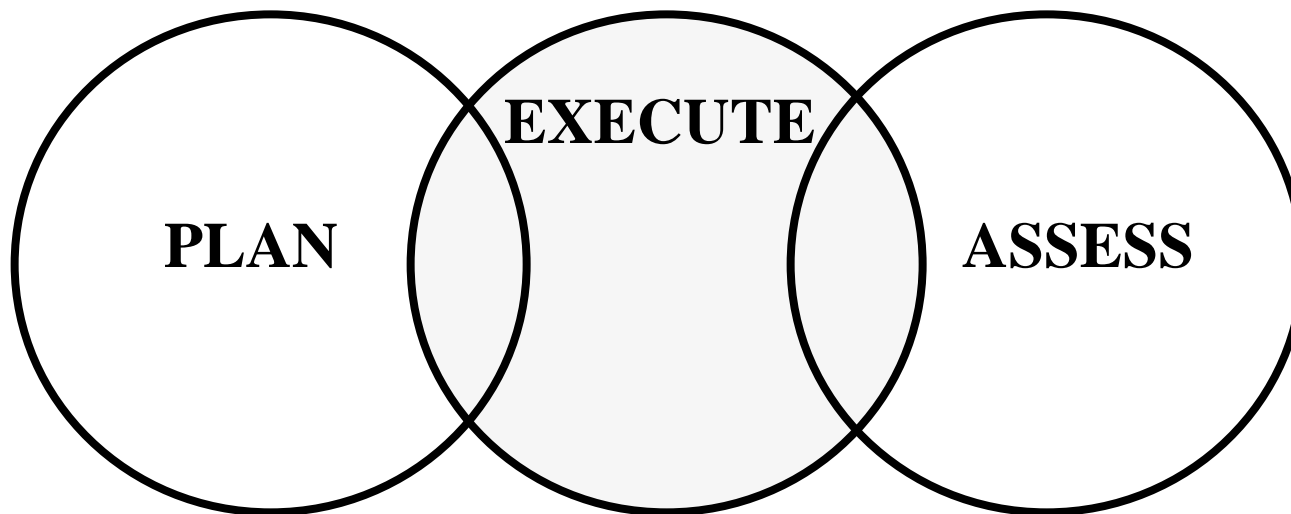3 Key Technologies that Contain COTS Elements: MDDS/ISSE/SMG
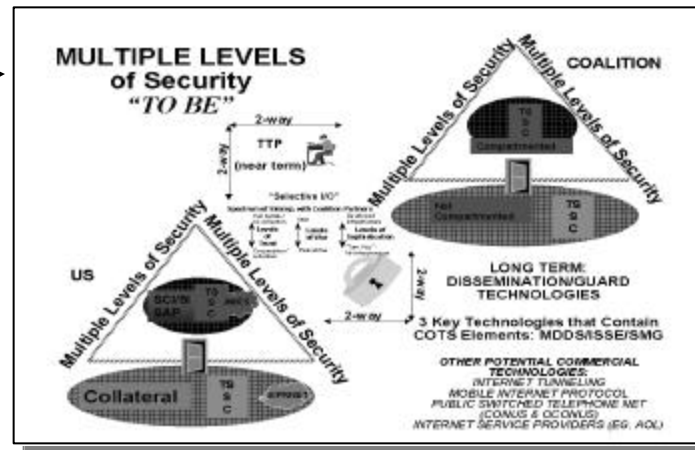
3. Track & sensor fusing

- Track Quality Indicators
- Joint Composite Tracking Network /Joint Data Network Gateway
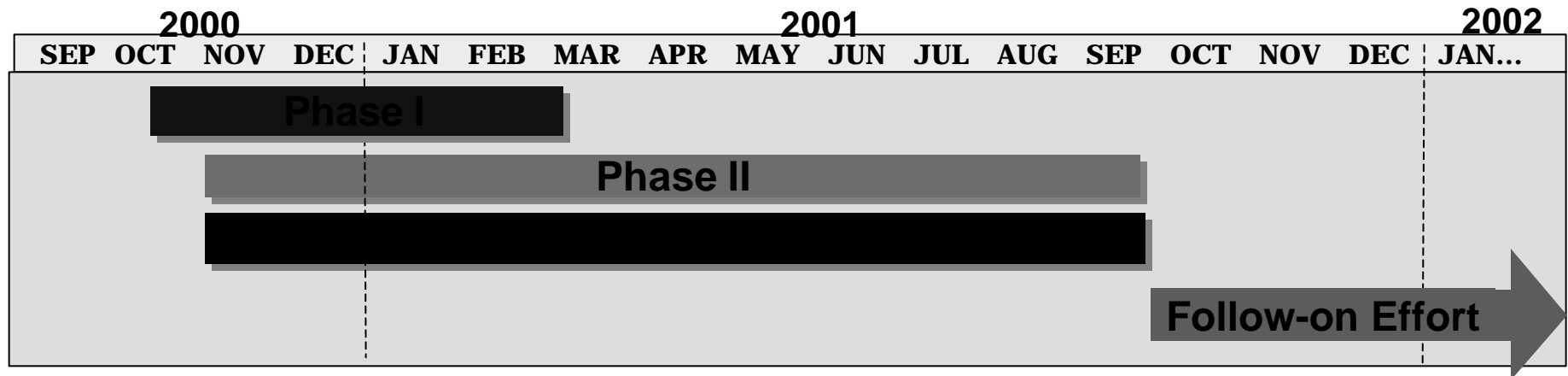- Efficient JTIDS coding schemes

Systems Engineering

Service Implementation Planning for FIOP

Goal: **All-source pictures of the battlespace to provide warfighters real-time operational relevant picture with actionable decision quality information**

The view of the battlespace provided to the warfighter must be more than a visualization tool and must be focused on execution of combat operations.
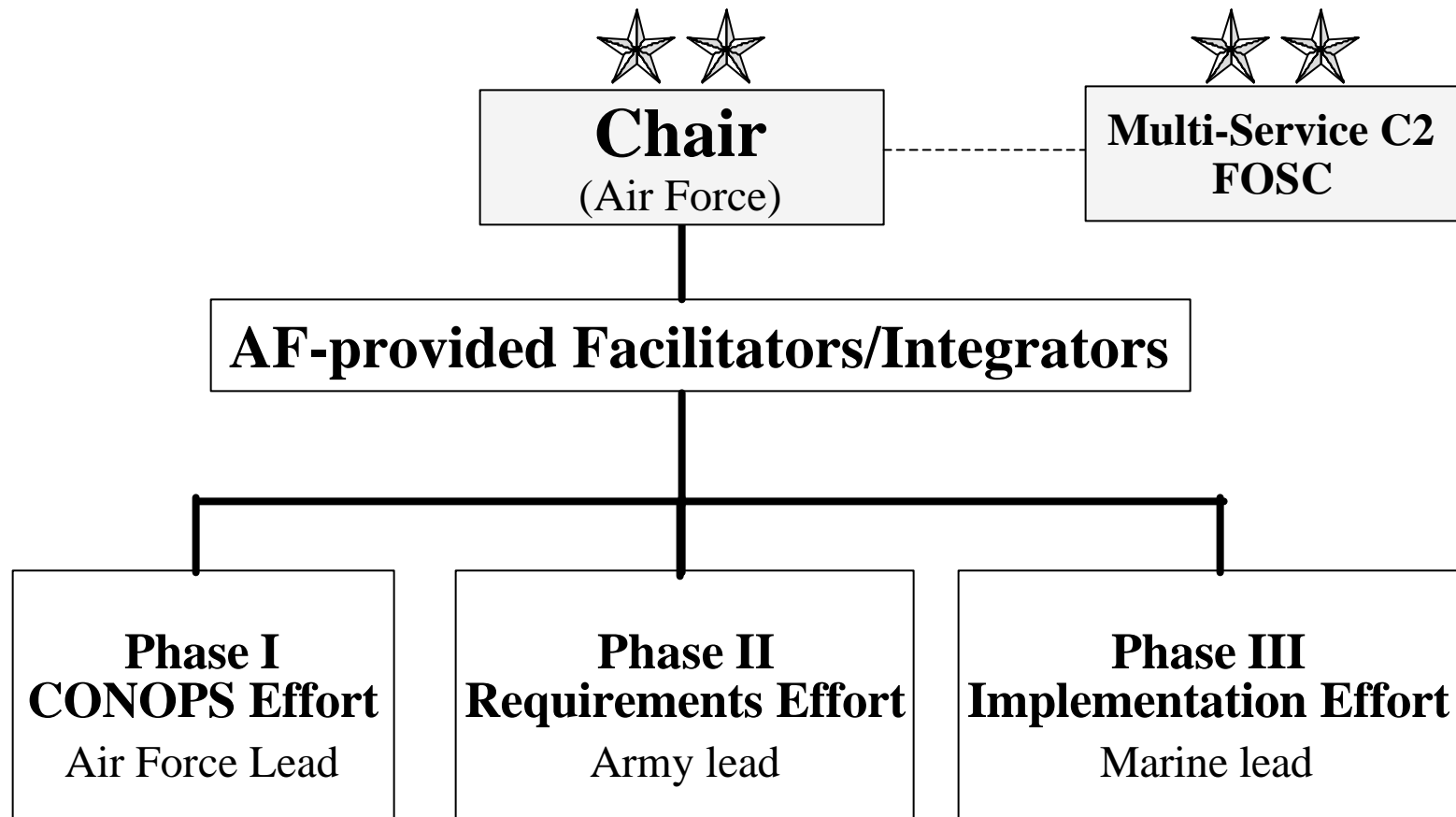
Service Implementation of FIOP
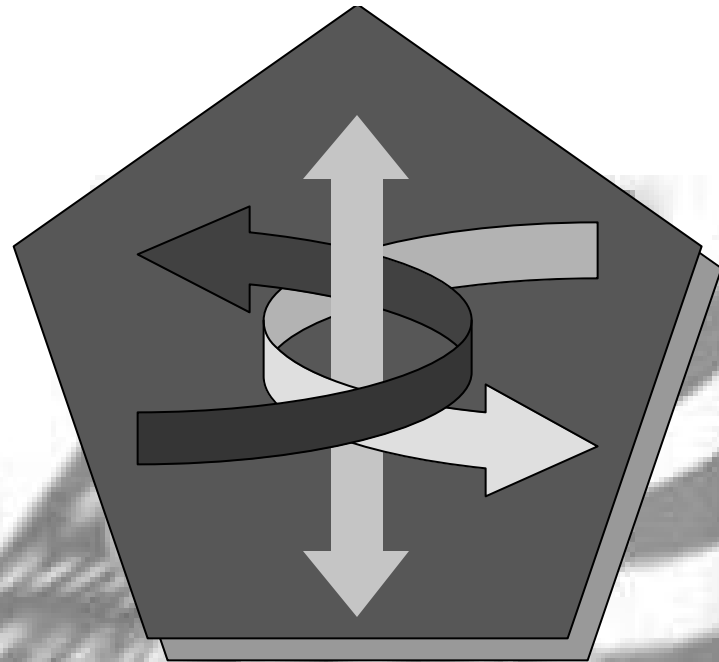# - Initial Planning -

	2000						2001									2002
SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN...

Phase I

Phase II

Follow-on Effort

- *Phase I: Oct 00 – Feb 01: CONOPS*
  AF led; develop Joint CONOPS

- *Phase II Nov 00 – Sep 01: Requirements Definition*
  Army led; develop appropriate requirements document.

- **Phase III: Nov 00 – Sep 01: Implementation Strategy**
  Marine Corps led; develop implementation strategy.

- *Follow-on: Starting FY02: Implementation*
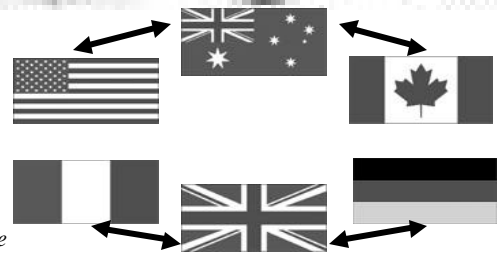
Service FIOP Planning Organization
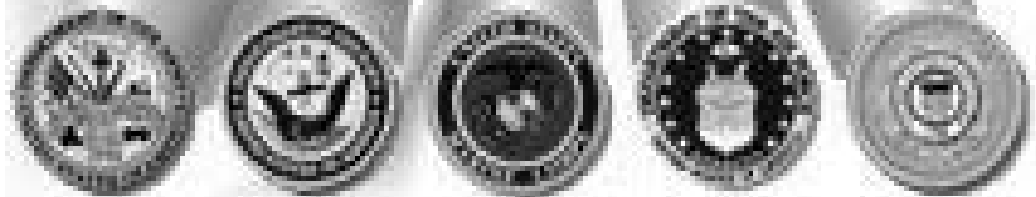
Chair
(Air Force)

Multi-Service C2 FOSC

AF-provided Facilitators/Integrators

Phase I CONOPS Effort	Phase II Requirements Effort	Phase III Implementation Effort
Air Force Lead	Army lead	Marine lead

FIOP

Bringing JV2020 Into Focus

NDIA Systems Engineering Conference

15
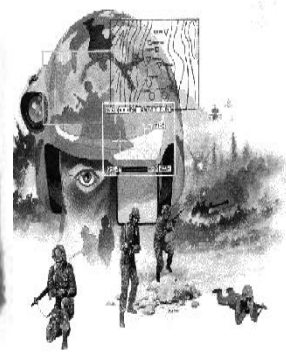
?s

Backup

Technical Approach: Underlying Data is Key

Common Shared Object Model

JPN Proto:
Lockmart
for C2
JWCA

XML
Reports

XML

XML

Loosely Coupled

JAVA
rep of
shared
model

Adapter

XML

Adapter

C2PC
USMC

MCS
USA

This is a synch. nightmare!
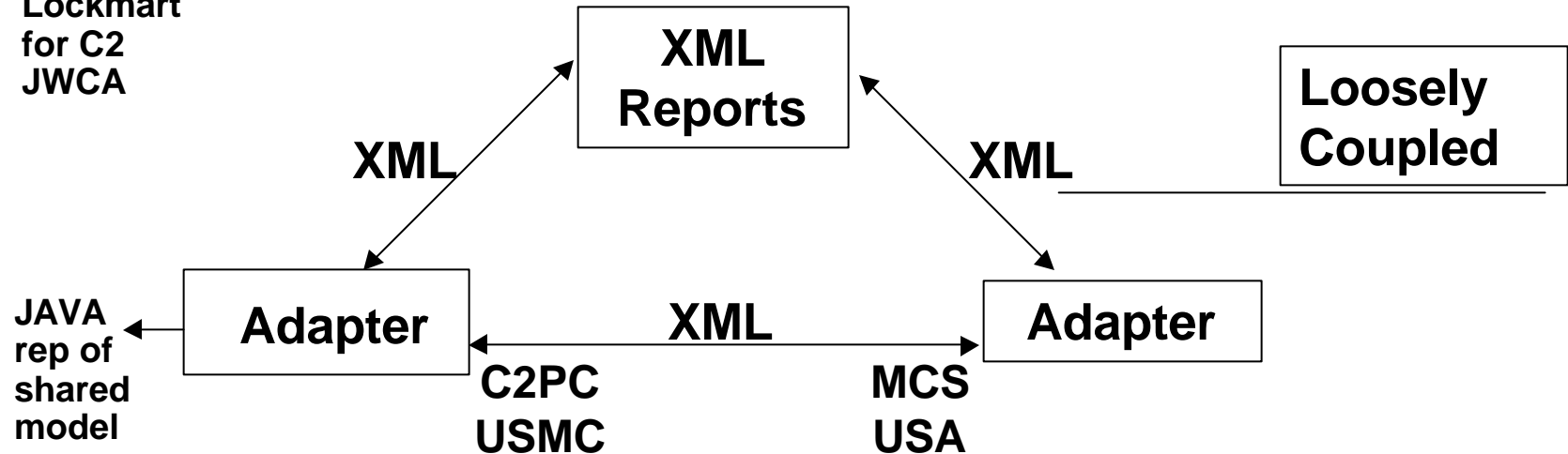
Vs. a Common Database Approach
All Services, synchronized, with coalition partners specify:
F-14
or F14
or F/14
or TMCT
or F14TMCT, etc. etc.

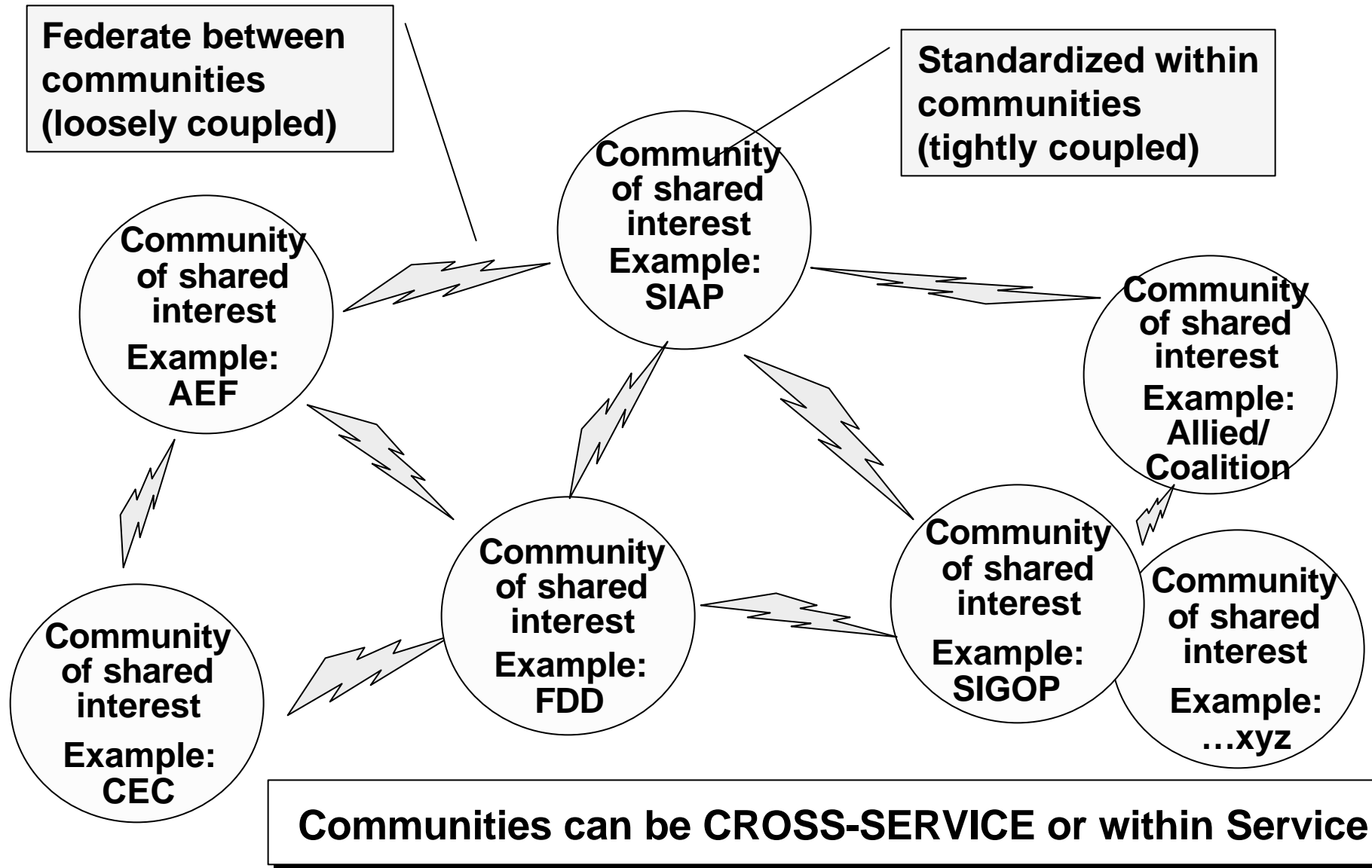**You Must Pick ONE!**

Tightly Coupled
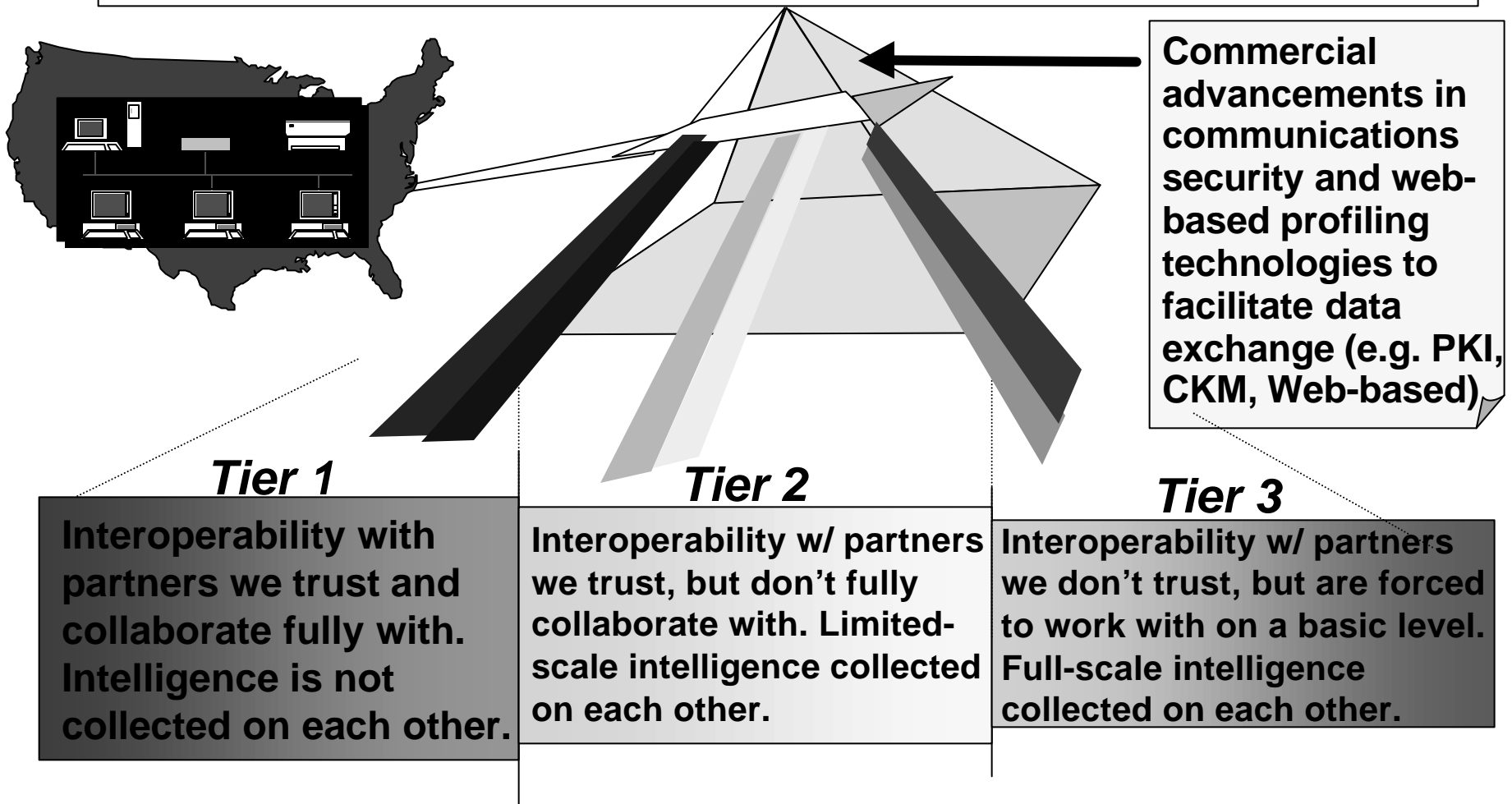
IF ANY, OR ONE, PLAYER CHANGES, RIPPLES THROUGHOUT!

Data Strategies:
Both Approaches Have Merit if Done Correctly

Spectrum of Interoperability with Coalition Partners:
3 Tiers of Coalition Interoperability

Commercial advancements in communications security and web-based profiling technologies to facilitate data exchange (e.g. PKI, CKM, Web-based)

Tier 1
Interoperability with partners we trust and collaborate fully with. Intelligence is not collected on each other.

Tier 2
Interoperability w/ partners we trust, but don't fully collaborate with. Limited-scale intelligence collected on each other.

Tier 3
Interoperability w/ partners we don't trust, but are forced to work with on a basic level. Full-scale intelligence collected on each other.

Interoperability must be tested with each tier of coalition partners to determine if needs are being met on both sides!

Top 10 Interoperability Issues

TADILS

Intel

C2

1. **Tactical Data Link Deficiencies**
2. **Combat ID**
3. **Blue Force Precision Location Information**
4. **Coalition Warfare Interoperability**
5. **Joint Composite Tracking Network (JCTN)**
6. **Joint Collaborative Planning Tools**
7. **Joint Air Planning/Execution Tools**
8. **US Army/Marine Corps Digitization Efforts**
9. **DIICOE-DODIIS Interoperability**
10. **Intelligence Systems Interoperability**

Coalition

Collab Plng

Source: US Joint Forces Command

Potential Service Tasks for FIOP Implementation

- Task 1: **Develop FIOP system architecture - show "as needed" interoperability between all service systems from Global Command and Control System (GCCS) down to the lowest, tactical-level systems like Force 21 Battle Command, Brigade and Below (FBCB2).**

- Task 2: **Develop an underlying data strategy for the Common Operational Picture, the Common Tactical Picture, and the Air/Ground/Maritime Pictures.**

- Task 3: **Correct TQI on Link 16.**

- Task 4: **Optimally combine JCTN and Link 16 for air and ground and maritime tracks.**

- Task 5: **Analyze and implement CDMA-like technology to maximize bandwidth use (Code Division Multiple Access) in tactical data information link radios.**

- Task 6: **Develop a rapidly deployable/easily configurable information security architecture that supports transmission of battlespace data to (and acceptance from) coalition servers in accordance with mission needs.**